

A systematic review of the separate and combined effects of energy restriction and exercise on fat-free mass in middle-aged and older adults: implications for sarcopenic obesity

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CRD summary

The review concluded that exercise was an effective tool to help men and postmenopausal women aged 50 years or above with a body mass index greater than 25 preserve their fat-free mass after moderate energy restriction-induced weight loss. Some methodological problems and data limitations limited the reliability of the authors' conclusions.

Authors' objectives

To assess the effects of energy restriction and exercise on fat-free mass in overweight and obese middle-aged and older adults.

Searching

PubMed was searched from 1950 to March 2009 for articles in English. Search terms were reported. The reference lists of relevant articles were searched.

Study selection

Randomised controlled trials (RCTs) and quasi-experimental studies of weight loss via energy restriction alone, exercise alone or exercise plus energy restriction in middle-aged or older adults were eligible for inclusion. Study participants had to have a mean age greater than 50 years, mean body mass index (BMI) greater than 25kg/m² and not be a smoker or diabetic; female participants had to be postmenopausal. Studies had to report on changes in fat-free mass using a valid method: dual energy x-ray absorptiometry, air displacement plethysmography, total body potassium or hydrostatic weighing. Studies where skin folds or bioelectrical impedance were used to measure fat-free mass were excluded. Studies in participants with osteoarthritis and mean BMI less than 25kg/m² and studies with a duration of less than six weeks or that had very low calorie diets (≤ 800 calories per day) were excluded.

The included studies considered various programmes of energy restriction only, exercise only, energy restriction combined with exercise and multiple intervention groups of exercise and energy restriction. The duration of intervention varied from nine to 52 weeks. Exercise interventions were primarily aerobic; resistance training was also included. The energy restriction interventions varied: some provided a proportion of all food and drink; others used diet counselling and did not provide food and drink.

The authors did not state how many reviewers were involved in study selection.

Assessment of study quality

The authors did not state that they assessed validity.

Data extraction

Data were extracted on fat-free mass and used to calculate mean differences and standard deviations, where possible. Data on mean and percentage changes in body weight and fat-free mass were extracted.

The authors did not state how many reviewers were involved in data extraction.

Methods of synthesis

A narrative synthesis grouped studies by intervention: exercise alone, energy restriction alone and energy restriction plus exercise.

Results of the review

Fifty-two studies were included in the review. Twelve studies had control groups.

Seventy-five per cent of the energy restriction groups achieved an absolute body weight reduction between 5kg and 10kg compared with 67% of the energy restriction plus exercise groups and 6% of the exercise-only groups.

Fifty-six per cent of the energy restriction groups achieved a fat-free mass loss of between 1.5kg and 3kg compared with 8% in the energy restriction plus exercise group and zero in the exercise-only group.

Sixty-one per cent of the energy restriction groups achieved between 5% and 10% body weight loss compared with 69% of the energy restriction plus exercise groups and 6% of the exercise groups.

Exercise alone had the most protective effect on fat-free mass: 0% had greater than 1.5kg fat-free mass weight loss.

Authors' conclusions

Exercise was an effective tool to help men and postmenopausal women aged 50 years or above with a BMI greater than 25 preserve their fat-free mass after a moderate energy restriction-induced weight loss programme (important for combating sarcopenic obesity).

CRD commentary

Inclusion criteria were broadly defined. One relevant data source was searched. The restriction to articles in English risked language bias. Publication bias was not assessed and could not be ruled out. It was unclear how many reviewers were involved in study selection and data extraction, which may have introduced reviewer error and bias into the analysis. No quality assessment was undertaken, which made it difficult to assess the reliability of the evidence base. Studies were narratively synthesised, which appeared appropriate given the type of data and clinical heterogeneity.

The review had some methodological problems and data limitations that limited the reliability of the authors' conclusions.

Implications of the review for practice and research

Practice: The authors stated that appropriate treatment for obesity in older adults should aim to reduce body fat while minimising muscle and bone losses and maintaining or improving physical function. If the goal was to reduce body weight without compromising fat-free mass, exercise and energy restriction might be appropriate. If the aim was to maintain fat-free mass then exercise alone should suffice.

Research: The authors stated that studies with direct measures of skeletal muscle in combination with functional outcomes following weight loss were needed. Research should aim to determine the effects of different types of exercise on fat-free mass during weight loss.

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Bibliographic details

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